COVID-19 RESPONSE

Increased Ventilation Guidance

TVA EnergyRight®
BUSINESS & INDUSTRY

About this guide

Increasing the outdoor air intake into a building will reduce the concentration of indoor air pollutants, which can lead to improved indoor air quality.

With airborne illnesses, such as COVID-19, the flu or the common cold, increased ventilation can reduce the risk of spreading viruses if an infected person enters your building, which helps protect staff and customers.

In the United States, ventilation rates and best practices are listed in ASHRAE Standard 62.1. This standard recommends ventilation rates by space type, occupancy, density, and other measures to ensure acceptable indoor air quality for occupants.

This guide summarizes those recommendations and how you can proceed with increasing ventilation in your building. We are here to assist if you have any questions.

Sincerely,
TVA EnergyRight

TVA EnergyRight® BUSINESS & INDUSTRY

About TVA EnergyRight®

EnergyRight for Business & Industry partners with your local power company to provide energy management advice and resources, and to offer incentives to offset some of the costs associated with smart energy technology upgrades.

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Ventilation standards

Occupancy Category	People Outdoor Air Rate R_p	Area Outdoor Air Rate R_a	Notes	Default Values		Air Class
				Occupant Density (see Note 4)	Combined Outdoor Air Rate (see Note 5)	
	cfm/person	cfm/ft^2		#/1000 ft^2	cfm/person	
Office Buildings						
Office space	5	0.06		5	17	1
Reception areas	5	0.06		30	7	1

Figure 1: ASHRAE Standard 62.1 Minimum Ventilation Rates Table

The table above is from ASHRAE Standard 62.1 for minimum ventilation rates. Though the Leadership in Energy and Environmental Design (LEED) program awards a credit for ventilation that exceeds ASHRAE Standard 62.1 by 30% or more in all spaces, TVA suggests buildings not exceed a maximum of 15% outside air (OA). This will help avoid excessive moisture or system overloading, or compromising the thermal comfort of occupants.

To better illustrate the recommended percent OA increase, the table below shows existing OA % increased by 30%, and OA % increase with a capped OA % of 15%.

Existing OA %	OA % Increase by 30%	New OA % (Max allowable is 15% OA)	OA% Increase
8	10.4	10.4	30%
10	13.0	13.0	30%
12	15.6	15.0	25%
13	16.9	15.0	15%

Note: It is recommended to check the existing OA % intake prior to making any adjustments. The HVAC system may already exceed code minimum for OA and a new baseline would have to be established. The above table is a representation of existing OA % and the suggested increase of 30% OA without exceeding 15% OA overall intake.

There are varying methods for calculating OA in HVAC systems. For example, if the outside air damper has incremental markings on the dampened position, a rough estimate of OA intake can be calculated by multiplying the HVAC unit rated CFM by the dampened position percent. Another way to estimate OA % is to use an anemometer to test the fraction of outdoor to supply air conditions by using the following equation:

$$OA = V_O \ / \ V_s$$

Where,

V_O = Outdoor air in CFM

V_s = Total supply air through the air handler in CFM, and

OA = Fraction of outdoor air to the supply air

OA is commonly controlled by modulating exhaust air, mixed air dampers, and outside air damper intake into the system.

Recommended approach

Though the above methods can provide information on OA %, we have found the Energy Balance approach to be the simplest field method for determining the OA % with reasonable accuracy. It can be calculated by measuring:

- Outside air temperature (OAT): ambient outdoor air dry-bulb temperature entering the system
- Return air temperature (RAT): dry-bulb temperature of recirculated air in the space; it is best to measure this near the HVAC system as it could have minor difference from the return air grill versus at the HVAC unit
- Mixed air temperature (MAT): dry-bulb temperature of air stream after mixing outside and return air

The equation to then calculate OA % is:

$$OA\ \% = \frac{(MAT-RAT)}{(OAT-RAT)} * 100$$

Field procedure

EQUIPMENT

We recommend having site maintenance personnel on hand and, depending on which method is chosen, an anemometer (for CFM) or temperature sensor to gather instantaneous return air temperatures, mixed air temperatures, and OA temperatures.

Figure 2: (Left) Anemometer, (Right) Thermocouple Logger for Space Temperatures

TAKING MEASUREMENTS

A simplified heating and cooling system is depicted below (Fig. 3) to show ideal measurement locations for OA, return air, and mixed air for calculating OA %. If these locations are not accessible, reasonable proxy locations may be used; however, the relative accuracy of the calculation may be slightly reduced (but likely still within acceptable engineering ranges).

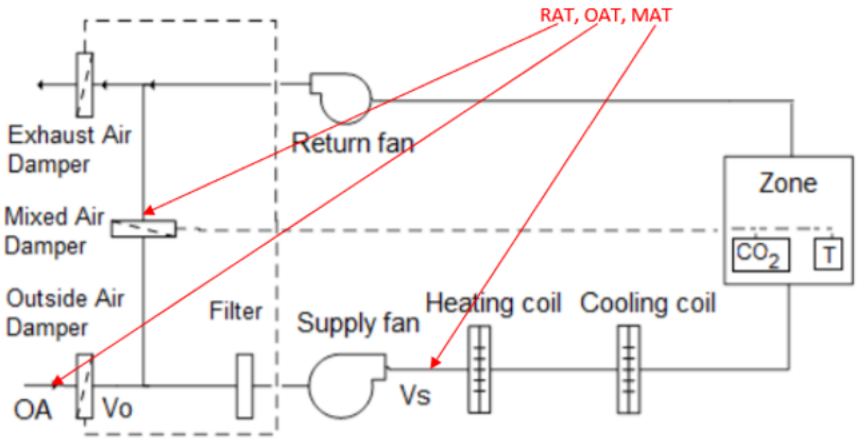

Figure 3: HVAC Schematic